

## ABSTRACT

An article with an organic-inorganic composite film that contains silica as its main component and does not separate from the substrate after the Taber abrasion test prescribed in Japanese Industrial Standards (JIS) R 3212. This composite film is formed of a coating solution containing a hydrophilic organic polymer by a sol-gel process. In this solution, for example, the amount of silicon alkoxide exceeds 3 mass% in terms of a  $\text{SiO}_2$  concentration. When the coating solution contains a phosphorus source, the molality of protons is 0.0001 to 0.2 mol/kg while the number of moles of water is at least four times the total number of moles of silicon atoms contained in the silicon alkoxide. This sol-gel process allows a film with excellent mechanical strength to be obtained even when the substrate is not heated up to a temperature exceeding  $400^\circ\text{C}$  and the film thickness exceeds 250 nm.